

15P213

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Name.....

Reg. No.....

**SECOND SEMESTER M.Sc. DEGREE EXAMINATION, JULY 2016**

(CUCSS - PG)

(Chemistry)

**CC 15P CH2 C08 - ELECTROCHEMISTRY, SOLID STATE CHEMISTRY AND  
STATISTICAL THERMODYNAMICS**

(2015 Admission)

Time: Three Hours

Maximum: 36 Weightage

**Section A**

(Answer *all* questions. Each question has 1 weightage)

1. Explain the term "concentration polarization"
2. How is overvoltage related to current density?
3. Write the half-cell reaction and Nernst equation for Oxygen electrode.
4. Define half wave potential. Explain its significance.
5. What do you mean by piezoelectricity?
6. Write Hermann-Mauguin notation for a)  $D_{4h}$  b)  $O_h$  point groups
7. Distinguish between ferromagnetism and antiferromagnetism with examples.
8. Distinguish between crystallographic point groups and space groups.
9. Define partition function. Explain its significance.
10. Define symmetry number. Find the symmetry number for methane.
11. Calculate the molar heat capacity of a solid at 10K. The characteristic temperature is 1000K.
12. Distinguish between microstates and macro states.

**Section B**

(Answer *any eight* questions. Each question carries 2 weightage)

13. What is the significance of hydrogen over voltage?
14. What are the limitations of Fuel cells?
15. What are the advantages of dropping mercury electrode?
16. Explain overvoltage and its measurement.
17. Show that fivefold axis is not possible in crystals.
18. What are the common line defects and plane defects in crystals.
19. Explain the thermal properties of solids.
20. Write a note on Bragg's equation and its applications.
21. Derive an equation to show the relationship between partition function and entropy
22. Briefly explain Einstein's theory for atomic solids.
23. Write a note on the ensemble concept.
24. Explain Bose-Einstein condensation.

### Section C

(Answer *any two* questions. Each question carries 4 weightage)

25. Derive Debye Huckel Onsager equation.
26. Discuss in detail Fermi-Dirac distribution law. Apply the law to electron gas. Explain its salient features.
27. Derive an expression for the equilibrium constant of an ideal gaseous mixture in terms of partition functions of reactants and products.
28. How solids are classified using band theory? Explain.

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